IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Gang Liu

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Title: A Laser Driver For A Laser Sensing System

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Commissioner for Patents
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AMENDMENT/RESPONSE

Further to the Office Action dated May 20, 2003, Applicant submits the following:

Amendments to the claims begin on page 2 of this paper. Remarks begin on page 6 of this paper.

1. (CURRENTLY AMENDED)A laser driver for generating coherent light comprising:

at least two laser diodes mounted in combination with a single thermo-electric temperature control means; and

a microprocessor for controlling and/or monitoring the activation of said laser diodes and said thermo-electric temperature control means;

a control circuit connected to an input power supply for the laser diodes having a MOSFET which is turned on when a power supply voltage is higher than ground and turned off when a power supply polarity is reversed and power supply voltage drops below ground, thereby turning off the laser diodes;

wherein said laser diodes are operable to simultaneously provide laser beams.

2. (CURRENTLY AMENDED) A method of controlling and/or monitoring a laser diode with a microprocessor having memory storage of data, the method comprising:

storing in said memory power-safety parameters of said laser diode with said microprocessor during operation of said laser diode~~, wherein said parameters include laser pulse peak output power, and laser pulse duration~~;

continuously monitoring said laser output power;

continuously monitoring laser pulse duration; and

calculating cumulative laser output power over time based on laser pulse peak output power and pulse duration;

disabling operation of said laser diode whenever the cumulative laser output power exceeds a predetermined limit.~~ one or more parameters are exceeded.~~

3. (ORIGINAL) The method of claim 2 further comprising a step of reenabling operation of said laser diode upon the occurrence of a predetermined contingency.

4. (PREVIOUSLY AMENDED) The method of claim 2 wherein said parameters include laser pulse duration and laser pulse peak output power during pulsed mode laser operation.

5. (ORIGINAL) The method of claim 4 wherein said parameters include laser pulse duration and laser pulse peak output power.

6. (ORIGINAL) The method of claim 4 wherein said microprocessor records the output power of said laser diode when said laser diode is activated.

7. (ORIGINAL) The method of claim 2 wherein a plurality of discrete power safety parameter limits are stored in said microprocessor and said microprocessor extrapolates a curve for determining said parameter limits for each input parameter.

8. (CURRENTLY AMENDED) A laser driver control system comprising:

a remote microprocessor;

a laser driver printed control board;

a host microprocessor on said printed control board;

at least one laser driver and a corresponding laser diode on said printed control board; and

a serial communication between said host microprocessor and said laser driver;

temperature control means ~~for~~ operable to ameliorate temperature change of the laser diode, said temperature control means controlling a temperature of said laser diode within a ~~predetermined temperature~~ range of about one degree from a temperature set point, corresponding to a desired output wavelength range of said laser diode;

wherein said host microprocessor is programmed to set a set point temperature of the temperature control means.

9. (ORIGINAL) The system of claim 8 further comprising a thermo-electric temperature regulating device.

10. (ORIGINAL) The system of claim 9 further comprising a heat sink thermally connected to said thermo-electric temperature regulating device.

11. (ORIGINAL) The system of claim 8 comprising a plurality of laser drivers on said printed control board and corresponding laser diodes.

12. (CURRENTLY AMENDED) A method of controlling a laser diode comprising:

setting a temperature set point for the laser diode, said temperature set point corresponding to an output wavelength;

activating a control circuit that includes said laser diode at a current level less than the current threshold to activate said laser diode;

activating said laser diode by increasing the current in said control circuit above said threshold for a specified duration; and

reducing said current below said threshold to deactivate said laser diode;

operating temperature control means to ~~maintain~~ ameliorate changes in the output wavelength of the laser diode during plural consecutive activations thereof, thereby maintaining ~~an~~ the output wavelength of said laser diode within a predetermined range during diode operation.

13. (CURRENTLY AMENDED) A laser driver control system comprising:

at least one laser diode, a circuit for sensing the current through said laser diode, comparator for continuously comparing said current to a predetermined value, and power supply switch for disabling said current to said laser diode if said current exceeds said value;

a power control circuit loop including the components of said sensing circuit, said comparator and power supply switch operably connected to a microprocessor to positively verify operation of said components, and means to disable said laser diode if operation of any of said components is not positively verified; and

a remote computer monitoring the pulse frequency, magnitude and duration of said laser diode and means to disable said laser diode if predetermined pulse and duration values are exceeded; and

means to disable said laser diode if predetermined product values of pulse magnitude and pulse duration are exceeded.

14. (CURRENTLY AMENDED) A laser driver control circuit containing P-channel MOSFET connected to the power input of said circuit which allows the preselected input power polarity to pass and which turns off if an opposite input power polarity is received, thereby turning off power through the circuit, the MOSFET comprising a body diode that is forward biased with respect to the preselected input polarity.